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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of Federal-State Joint Board on Universal Service	CPD Docket No. 97-2

JOINT COMMENTS OF BELL ATLANTIC AND NYNEX

The Bell Atlantic telephone companies[1] ("Bell Atlantic") and the NYNEX Telephone Companies[2] ("NYNEX") hereby file their Joint Comments in response to a Staff paper, *The Use of Computer Models For Estimating Forward-Looking Economic Costs* ("Staff Analysis").

I. INTRODUCTION AND SUMMARY

On January 9, 1997, the Commission issued a Public Notice [3] requesting comments on the above noted Staff paper. Our comments will focus on the

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[1] The Bell Atlantic telephone companies are Bell Atlantic-Delaware, Inc.; Bell Atlantic-Maryland, Inc.; Bell Atlantic-New Jersey, Inc.; Bell Atlantic-Pennsylvania, Inc.; Bell Atlantic-Virginia, Inc.; Bell Atlantic-Washington, D.C., Inc.; and Bell Atlantic-West Virginia, Inc.

[2] The NYNEX Telephone Companies are New York Telephone Company and New England Telephone and Telegraph Company.

[3] Public Notice, Commission Staff Releases Analysis of Forward-Looking Economic Cost Proxy Models, DA 97-56, rel. January 9, 1997.

utility of proxy models, will identify the model inputs that we believe have the most significant impact on proxy results, and will discuss various aspects of model validation.

Our evaluation of proxy model results primarily deals with the BCM2 and the Hatfield Model Version 2.2.2. Just recently, two new models were presented to the industry, the BCPM (a "best of breed" incorporating features of the BCM2 and Pacific Telesis' Cost Proxy Model) and Hatfield Version 3.0. In order to give interested parties an opportunity to comment on these new models, the Commission granted a second extension for filing comments in this proceeding. However, the data filed with these new models were minimal, which has limited our validation efforts and analysis. The BCPM sponsors filed results data only for the state of Texas.[4] Results from the Hatfield Model 3.0 were filed only for certain companies in California, Colorado, New Jersey, Washington and Texas. As such, a limited state-by-state comparison of the models' results can only be done for Texas. In addition, due to significant changes in methodology, it may be futile to attempt to compare the results calculated by these models with their predecessors.

As we know from our experience in proxy model analysis, delving into the intricacies of these new models will require more time and nationwide data.

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[4] A revised model covering all states became available late on the business day prior to this filing. Initial attempts to analyze this model have been hampered by programming errors.

It is impossible to determine the validity of these models simply by examining the methodologies and documentation. The continual delay by model sponsors in filing their model and placing adequate national data on the record in this proceeding has seriously limited other parties' validation efforts. As we have done with earlier version of proxy models, we will continue to make every attempt to conduct meaningful analysis.

Regardless of whether these models undergo further refinement, the Commission should not rely on these, or any other, proxy models for purposes of universal service, access reform, or pricing of interconnection, unbundled network elements, and transport and termination. The proxy models develop forward-looking costs of operating hypothetical networks that do not exist, and that will never exist. Therefore, on a theoretical level, the results of the models have no relationship to the actual costs that the local exchange carriers ("LECs") incur to provide service, and they do not represent the costs that new entrants would incur. If the Commission were to base pricing decisions on the model results, it would deny the LECs a fair opportunity to recover their costs, and it would discourage efficient providers from entering the market.

In addition, the models that have been presented to the Commission and to the industry are inherently unreliable and results-oriented. In other words, they will produce any results that the designers intend, which accounts for the fact that the models proposed by the interexchange carriers consistently

underestimate LEC costs. They do not accurately target high cost customers for purposes of providing universal service support, and they would cause large shifts in revenues between regions if used for that purpose.

The Commission should use the rates developed at the state level for unbundled network elements, plus retail "customer care" costs, to develop universal service support. The Commission should leave the pricing of interconnection, unbundled network elements, and transport and termination to the states, as intended in the Telecommunications Act of 1996. In no circumstances should proxy models be used to develop access charges or other rates.

II. FORWARD-LOOKING ECONOMIC COSTS SHOULD NOT BE USED AS A BASIS FOR PRICING

A. Competitive Pricing Must Be Based On A Firm's Actual Costs.

The staff concludes that proxy models should not include sunk or historically-incurred costs, because prices that are based on forward-looking "economic" cost (which, in the Commission's interconnection orders, has been defined as the incremental cost of a hypothetical, least cost network) would provide the correct signals for investment and entry.[5] The staff states that "basing prices on embedded costs would fail to establish the critical link between economic production costs and market prices, and would be inconsistent with

[5] Staff Analysis, para. 9.

the goal of efficient competition."[6] Since the Commission defines embedded costs as the costs that are recorded in the incumbent's books of account,[7] the Staff Analysis implies that the LECs should not be allowed to charge prices which reflect their actual costs.

This would be both bad economics and bad policy. In an unregulated market, firms will enter only if the prevailing market prices are sufficient to give them a reasonable prospect of recovering all of their costs. If an industry is facing conditions of long run decreasing costs (for example, where technological advances are likely to reduce unit investment costs over the foreseeable future) a firm will not enter if prices are continually ratcheted down such that past investments cannot be recovered. Entry will be discouraged until supply is restricted enough to cause prices to rise to the level that will allow a new entrant to recover its costs despite the rapid obsolesence of past investments. For this reason, the proposal to use forward-looking cost models that exclude historically-incurred cost, and that assume a hypothetical network utilizing only the most advanced technologies, does not replicate conditions in "dynamic, competitive markets."[8]

The attached analysis by Dr. William E. Taylor demonstrates that efficient competition occurs when each competitor is able to recover its own costs, and to

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[6] *Id.*

[7] *See* 47 C.F.R. Section 51.505(d)(1).

[8] Staff Analysis, para. 9.

offer discounts based on its own incremental cost.[9] In that situation, consumers respond to pricing signals by choosing the lowest cost, most efficient competitor. New entry is encouraged when a potential supplier perceives, through the pricing of incumbent providers, that it has lower costs and is more efficient, and thus will be able to gain market share by under-pricing the incumbents.

The use of least-cost, hypothetical proxy models to prescribe the prices of the LECs would distort these market signals. If an incumbent LEC were forced to price at the cost of a hypothetical, constantly updated network, the incumbent's price would be prescribed at a level below its own long run incremental cost, and a new carrier with a lower-cost network would not perceive an opportunity to price below the incumbent and gain market share. This would tend to discourage new entry, while at the same time depriving the LEC of the revenues it would need to maintain and improve the network through which it actually provides service. Thus, pricing incumbent LEC services on the basis of hypothetical forward-looking costs would harm competition, and it would prevent development of a more efficient network.

B. The Commission May Not Constitutionally Deprive The LECs Of The Ability To Recover Their Actual Costs.

For these reasons, the Commission should not use proxy models of hypothetical forward-looking costs to establish LEC prices for interstate access

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[9] *See* Exhibit A.

services or unbundled network elements. This is not just good economics, it is a constitutional mandate. It is long-standing law that the Fifth Amendment requires that a utility be permitted to charge a price that will allow it to "maintain its financial integrity, to attract capital, and to compensate its investors for the risk [they have] assumed."[10] Thus, to meet the constitutional floor, "rates must provide not only for a company's costs, but also for a fair return on investment."[11] Before a return on investment can be achieved, the company's costs must be recovered. These costs cannot be based on someone else's costs, or on a hypothetical network as contemplated in the Staff Analysis. They must be the company's actual costs. They cannot ignore the current cost of investments made in the past that have not been fully depreciated (which are described in the Staff Analysis as "sunk or historically incurred costs"), and that are still used and useful, or the costs of ongoing operations.

III. USE OF PROXY MODEL FOR MULTIPLE OBJECTIVES

The staff suggests that proxy models may be used for multiple regulatory objectives.[12] Although the models were originally designed to identify high cost areas, the Staff suggests that they could also be used in a prescriptive approach to the pricing of access services and unbundled network elements.[13] We

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[10] *Duquesne Light Co. v. Barasch*, 488 U.S. 299, 310 (1989) (*quoting Fed. Power Comm'n v. Hope Natural Gas Co.*, 320 U.S. 591, 605 (1944)).

[11] *Tenoco Oil Co. v. Dept. of Consumer Affairs*, 876 F.2d 1013, 1020 (1st Cir. 1989).

[12] *See* Staff Analysis at para. 11.

[13] *See id.*

disagree. The models do not reflect the actual cost of providing service, and they cannot be used to set prices for access charges or unbundled network elements. Because the models are based on forward-looking costs of hypothetical networks that do not exist, and that will never exist, they systematically underestimate the LECs' costs.

Forward-looking proxy models cannot be used to prescribe LEC prices for access services or unbundled network elements because they are inherently arbitrary.[14] Not surprisingly, the proxy models advocated by the IXCs develop investment estimates that are significantly lower than the embedded levels of investment reflected in the LECs' ARMIS reports, and some of them also report significantly lower expense levels than ARMIS. Although the staff speculates as to the reasons for these discrepancies, the obvious explanation is that a proxy model will produce whatever result the designer intends. The subjective nature of these models is shown by the fact that, although the Hatfield Model has been revised several times, ostensibly to correct the underlying assumptions, the output has changed very little.

A more fundamental issue is whether a network designed on a computer simulation could ever demonstrate that the LECs are inefficient, as some of the proponents claim. The large LECs have been under price caps, with annual productivity offsets, for more than five years. The price cap system has given

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[14] *See id.*, paras. 12-14, discussing the lack of consistency of the models with independent evidence.

them a strong incentive to eliminate unnecessary costs and to become more efficient. They have all gone through significant personnel downsizing.[15] They have instituted quality programs and process re-engineering. Thus, there is no reason to presume that the LECs are inefficient, or that they have systematically overbuilt their networks and incurred unnecessary costs.[16]

To the extent that the models reflect different engineering assumptions than the current network, they are based on the theory that LEC engineers deliberately designed a network that is less efficient than a computer programmer could design with nothing more than maps, census data, and locations of existing wire centers. This is pure hubris. The proxy models could not be used to design actual facilities. Regardless of how many factors they include -- such as terrain, slope, distance, climate -- they cannot reflect all of the engineering factors that the LECs must take into account in designing their

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[15] At its peak in the 1980s, NYNEX had approximately 90,000 employees in the telecommunications sector. Today, NYNEX has only 63,000 employees in that sector. Similarly, Bell Atlantic had approximately 81,000 employees in 1988; today it has fewer than 60% of that number. It is hard to see how NYNEX and Bell Atlantic could reduce personnel expenses to the levels implied in the proxy models without jeopardizing their ability to meet their service obligations.

[16] Indeed, the LECs are probably close to capacity now, considering the strong growth in lines that they are experiencing and the service availability and network congestion problems that periodically surface. The well-publicized recent sharp increases in Internet traffic demonstrate the need to design sufficient capacity in the network to handle unforeseen demands on the network. Yet, the current access charge rules prevent the LECs from recovering the costs of expanding capacity for Internet traffic from the cost causer -- the Internet provider. Any reduction in the level of access charges would only worsen the problem.

networks. Nor do they take into account the continually-evolving marketplace and regulatory environment, both of which require the LECs continually to redesign their networks.

Thus, the proxy models are too arbitrary and hypothetical to provide assurance that LEC prices based on these models would permit the LECs to recover their actual costs.[17] The models should not be used to set prices for any federal regulatory purpose. At most, the proxy models could be used to identify relatively high cost areas for purposes of distributing universal service support if, and only if, the previously-identified regional biases can be resolved.[18] Otherwise, Bell Atlantic and NYNEX ratepayers will be required to subsidize ratepayers in other parts of the country.

IV. MODEL INPUTS

The record in the universal service proceeding is laden with debate regarding the correct data to be used for the model inputs that most dramatically affect proxy results, i.e. structure costs, cost of capital, fill factors and line counts. In order to approximate the cost of telecommunications services with a proxy model, the model inputs must approximate the actual cost of operating in a fully competitive market, which may vary from company to company and area to

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[17] These models would never meet the judicial standards for disallowing investments that were prudent when they were incurred, since the models ignore technologies that were the best available at a previous point in time.

[18] *See* Joint Reply Comments of Bell Atlantic and NYNEX on Joint Board Recommendation, filed January 10, 1997, at pp. 11-13.

area. As is shown in the attached excerpt from testimony recently presented in Delaware, replacing nationwide theoretical inputs with those appropriate to a particular jurisdiction can have dramatic effects on the results.[19]

The Staff Analysis states that proxy models should reflect projected economic lives of investments rather than physical plant lives.[20] However, some of the proxy models calculate depreciation expense by using uneconomic straight-line methods and depreciation lives similar to those currently prescribed for the LECs. This assumes that regulatory book values correspond approximately to economic values. However, the existing LEC depreciation methods and lives do not reflect the economic values of telecommunications plant in a competitive environment. In a competitive marketplace, the LECs will only be able to recover the economic value of their capital investments. By incorporating backward-looking , i.e. straight-line, methods of depreciation and unrealistically long prescribed lives into the proxy models, the model designers underestimate the costs of providing telecommunications services.

The proxy model advocates cannot have it both ways. They propose to base costs on an ideal competitive network, yet they base depreciation on a method that makes sense only for a rate of return regulated monopoly. When using a foward-looking model to approximate the cost of providing telecommunications services in a competitive environment, accelerated

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[19] *See* Exhibit B.

[20] *See* Staff Analysis, para. 61.

depreciation methods must be employed. In addition, in a competitive market, where the pace of technological change is rapid, shorter economic lives for newly installed plant should be anticipated. As such, the models should be modified to incorporate shorter, foward-looking economic lives such as those employed by both AT&T and MCI for their own networks. They must also take into account the many additional costs, such as a massive increase in advertising expenses, which the LECs will incur in a competitive local environment.

V. GEOGRAPHIC UNIT OF ANALYSIS

The Staff Analysis notes that the Commission is continuing to investigate the relative advantages of using Census Block Groups ("CBGs") as the basic unit of analysis for calculating the cost of providing telecommunications services.[21] Through our model validation efforts, we have found that small geographic areas, like a CBG, often contain large variations in costs that are not reflected in the outputs of the models.

By assuming that populations are evenly distributed within a CBG and that customers are approximately the same distance from the central office, proxy models attempt to identify costs for small geographic areas. This approach may be accurate for some rural areas, where customers in high cost neighborhoods are generally far from the central office. However, it does not

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[21] *See* Staff Analysis, para. 23.

represent costs accurately for areas such as the Northeast and Mid-Atlantic. In many of these areas, the CBG is shaped irregularly, with many customers clustered relatively close to the central office, while some are very far away.

This point was clearly illustrated in our Joint Reply on the Joint Board Recommendation in Docket 96-45.[22] In our analysis of BCM2 results for CBGs in the Northeast, we found that some CBGs that include low-cost customers in relatively close proximity to the wire center are characterized as high cost. Additionally, these CBGs are adjacent to CBGs of similar or greater distance from the same wire center that are characterized by the BCM2 as low cost. Thus, high-cost CBGs will include many customers that are actually clustered close to the wire center and that are low-cost, and low-cost CBGs will have many customers that are high-cost. As such, averaging costs by CBGs does not accurately group customers that are high or low cost. Accordingly, CBGs should not be used to target high-cost support. More broadly, no proxy model, whether based on small or large geographical areas, accurately reflects the actual costs that the LECs face in providing service.

In addition to our concerns over averaging costs by CBGs, we also found that proxy models that estimate costs by CBG produce anomalous results by carrier and by state. As Bell Atlantic and NYNEX previously demonstrated in comparing the universal service support levels for a given RBOC between the

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[22] *See* Joint Reply Comments of Bell Atlantic and NYNEX, CC Docket No. 96-45, filed January 10, 1997, at pp. 10-13.

BCM2 and the Hatfield Model, both of which purport to identify costs by CBG, the models produce unexplained, dramatically different results.[23] These differences cast doubt on the ability of proxy models to target high-cost areas and produce reliable cost results.

These anomalies demonstrate that the proxy models, as proposed to be used for federal regulatory purposes, have inherent problems that are not evident from an examination of the methodology or input assumptions. While the models give the appearance of precision, they do not consistently group high cost customers, and they produce unexplainable differences in support levels among carriers and among states. Therefore, the Commission should not rely upon any of the existing models to develop high-cost support, access charges or pricing of interconnection and unbundled network elements.

The Commission should not attempt to cure the defects in the current models by developing a model that disaggregates costs below the CBG. Unless the cost of each circuit were to be calculated based on the actual customer location -- a highly impractical task -- any type of disaggregation would be inherently inaccurate. Instead of attempting to develop theoretical proxy costs based on CBGs or smaller areas, the Commission should base universal service costs on the rates that are established in the states for unbundled network elements (plus, as discussed below, "customer care" costs), using whatever level

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[23] *See id.* at pp. 11-13. The proponents of the proxy models have not attempted to justify these anomalies.

of disaggregation a particular state has selected. This process would have three advantages. First, it would avoid the difficulties in administering different support levels for hundreds of CBGs in each state. Second, it would allow the Commission to use rates that reflect determinations by each state as to the costs of the underlying facilities that the carriers would use to provide universal service. Third, uneconomic arbitrage would be avoided, because purchasers of unbundled network elements would receive universal service support commensurate with the rates for those elements.

Accordingly, rather than relying on abstract, theoretical models for determining costs, the Commission should base universal service support on the rates for unbundled network elements. However, in applying those rates, the Commission would have to add "customer care" costs, *i.e.*, the costs of retail marketing and customer service and other costs that are incurred by the LEC in providing universal service to retail customers, and that are not included in the cost of unbundled elements.[24] These costs would be compared to the revenue benchmark to determine the amount of support that is needed in each high cost area.

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[24] This amount could be determined by reference to the discount between retail and wholesale rates determined by the state under Section 252(d)(3) of the Act.

VI. CONCLUSION

New versions of existing proxy cost models are being released frequently, each with varying assumptions and, in some cases, dramatically different outputs. These continual revisions show that the models will never be sufficiently stable to form the basis of sound regulatory policy. Notwithstanding the fact that each model revision was intended to correct past shortcomings, each of these revisions, in fact, only raises new concerns and debate regarding the reliability and accuracy of the proxy model concept. Instead of trying to perfect these constantly-changing models, the Commission should use the state-determined rates for unbundled network elements plus customer care costs as the basis for universal service support.

There is no clear and compelling reason for the Commission to use any national proxy cost model to implement the provisions of the 1996 Act. The states have the ability and authority to set prices using techniques they have found appropriate, and the Commission should not attempt to second-guess their determinations. Accordingly, the Commission should discard the use of proxy cost models.

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EXHIBIT A

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AN ANALYSIS OF CONCEPTUAL ISSUES REGARDING PROXY COST MODELS

by

WILLIAM E. TAYLOR

February 13, 1997

I. INTRODUCTION

The Federal Communications Commission (Commission) Staff analysis on proxy cost models entitled The Use of Computer Models for Estimating Forward-Looking Economic Costs presents an important contribution on the techniques in estimating forward-looking economic costs—particularly cost proxy models—of supplying telecommunications services.[1] Much of the debate on the adequacy of these models for the purpose for which they are offered is located at the arcane intersection of economic theory and network engineering. While correct input values—such as cost of capital and depreciation expenses—improve the ability of the models to approximate actual forward-looking costs incurred by an efficient provider, applying those inputs to a hypothetical network that (in some of these models) departs substantially from the ILEC's actual network may fail to estimate accurately the true costs to society of producing telecommunications services. Modeling an inappropriate hypothetical network—even with correct engineering and economic assumptions—simply will not calculate anything resembling "the incremental costs that incumbents actually expect to incur in making network elements available to new entrants."[2]

Decisions regarding universal service support must be based on *actual* incumbent costs—not based on an unrepresentative hypothetical network. For calculating relative costs in identifying high-cost areas, the Commission can reasonably rely as its primary tool on incumbent Local Exchange Company (ILEC) costs as determined at the state level.

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[1] *The Use of Computer Models for Estimating Forward-Looking Economic Costs, A Staff Analysis*, Federal Communications Commission, January 9, 1997.

[2] *Implementation of the Local Competition Provisions of the Telecommunications Act of 1996*, CC Docket No. 96-98, First Report and Order, 11 FCC Rcd 15499, 1996, ¶685 (Interconnection Order); *Order on Reconsideration*, CC Docket No. 96-98, 11 FCC Rcd 13402, 1996 (Interconnection Reconsideration Order); *Petition for Review Pending and Partial Stay Granted, sub nom.* Iowa Utilities Board et. al v. FCC, No. 96-3321 and consolidated cases, 8th Cir., October 15, 1996; *Partial Stay Lifted in Part*, Iowa Utilities Board et. al v. FCC, No. 96-3321 and consolidated cases, 8th Cir. November 1, 1996.

II. THEORETICAL ISSUES

A. Static vs. Dynamic Considerations

When a proxy cost model of local exchange networks is based on static notions of efficiency—as in some, but not all such models—it will fail to capture adequately the correct economic costs facing society and will not provide policymakers with reliable information. Basing prices on costs that no real-world provider could hope to meet is anticompetitive—not procompetitive—because it would stifle—not promote—the most effective type of competition: facilities-based. Incremental costs must approximate the *actual* amount of resources that society foregoes—opportunity costs—when it consumes local exchange services. Failure to do so would lead to inefficiencies and provide incorrect market signals to consumers and to potential entrants.

Some proponents of proxy cost models argue that building a brand new system instantaneously from the ground up is consistent with the textbook definition of long-run costs. I disagree. Moreover, models based on this approach are at odds with how real businesses incur costs, especially capital-intensive firms that expand their facilities by adding capacity in discrete modules. Almost five years ago, Professor Alfred Kahn advised the FCC of the need to employ a realistic and practical perspective:

> In strict economic terms, the concept of long-run marginal costs relates to a hypothetical situation in which all inputs are variable and a supplier confronts the possibility of installing entirely new facilities, in effect from the ground up. And the "marginal" relates to the incremental cost of a single unit of output. The concept of long-run incremental cost, in contrast, is more pragmatic: it takes a firm's past history as given, does not assume that it is writing on a blank slate, but recognizes that it will ordinarily be planning the installation of new capacity, at whatever that additional investment will cost given its current situation, and it spreads the costs over either the total output of that additional capacity—in that sense it is a kind of average incremental cost—or over the

> additional output that is likely to be induced by a price reduction under consideration (or curtailed in response to a price increase.)[3]

The assumption that it is appropriate to estimate the cost of a new network designed to minimize the cost of serving a known, constant demand is incorrect. Real ILECs do not face a known, constant demand. Instead, they must provide both for growth and uncertainty in demand. Real networks are built over time and must constantly change to accommodate changes in demand and in regulatory policy that require incumbents to redesign existing networks, (e.g., equal access and expanded interconnection). Thus, the costs of a real network are higher than the cost of a network that is built instantaneously to serve a "snapshot" level of demand. By simulating population locations and a network to serve them, a static model produces a network that is independent of past LEC investment decisions, but is unlikely to resemble the network that an efficient firm would use to serve households and businesses where they actually are located.

This difference does not imply that the local exchange carrier is inefficient. An efficient carrier operating in the real world attempts to minimize its expenditures by making reasonable and prudent decisions while serving a growing, uncertain demand throughout the service territory and meeting regulatory and market obligations regarding service quality. According to the assumptions of static engineering approaches, an efficient carrier could be accused of being inefficient at every moment of time. If a carrier were to redesign its network each year to minimize the cost of serving the demand which prevailed each year, that network would turn out to be grossly expensive when viewed over several years.

A static engineering approach that assumes all capacity will be built instantaneously at a single point in time does not reflect real networks and fails to approximate actual opportunity costs. This leads to the ludicrous result that an efficient forward looking firm would install the entire network in one fell swoop. Costing techniques must recognize that networks both replace outdated and defective equipment and accommodate growth by adding capacity to the

[3] Affidavit of Alfred E. Kahn, Before the Federal Communications Commission, *In the Matter of Expanded Interconnection with Local Telephone Company Facilities*, CC Docket No. 91-141, August 6, 1991.

system throughout the life of the plant. An efficient firm in the real world adds capacity to its existing plant—accounting for the trade-off between lower unit costs for larger installations (e.g., larger cable sheath sizes) and the costs of carrying unused capacity over time.

For example, an efficient firm serving a growing market over time might place a 1200-pair cable and relieve it ten years later with an additional 1200-pair cable. Because static models assume that loop facilities are installed instantaneously, they attempt to serve total demand with a 2400-pair cable. The LEC's use of two 1200-pair cables does not mean that the ILEC is inefficient. To the contrary, the LEC's practice would reflect efficiency as it must be measured in the real world.[4] In effect, these static models capture the economies of scale associated with placing larger cable size and, therefore, underestimate the costs that would occur in the real world where cables are not placed in that manner.

Switch costs provide a similar example of the error in sizing network investment, once and for all, to serve the demand at hand. It is incorrect to assume that real networks are able to install new switches sized exactly to serve current demand which is unchanged and known with certainty. In fact, LECs frequently buy additional lines for their already-installed switches, and add-on lines cost considerably more than additional lines purchased with the new switch.[5] The fact that ILECs purchase add-on lines and incur higher costs does not reflect ILEC inefficiency but rather efficient investment under real-world conditions.

1. Hypothetical Efficiency vs. Reasonably Achievable Efficiency

A static, long-run model assumes a perfect and frictionless world where the ideal of perfectly optimized networks is achieved at all times, including times of sweeping market and regulatory change. While the costs yielded under such assumptions may be closer to those produced by pure engineering models that have embedded in them best engineering and cost-minimizing practices, the real world often produces sources of cost that engineering models

[4] J. Shifman and R. Choura, "Universal Service Existing Models: What can they be used for?," submitted to the Biennial Regulatory Information Conference at NRRI, September, 1996, p. 23 (Shifman-Choura).

[5] Northern Business Information, US Central Office Equipment Market, 1995 McGraw Hill.

cannot predict in advance. Therefore, what is efficient from a hypothetical *engineering* and frictionless standpoint may be quite different from the efficiency that can reasonably be achieved by actual operating networks.

For example, regulatory policy affects the network design of incumbents through decisions intended to provide high reliability and customer provision standards. Increasing competition also will affect network design through regulatory mandate. This includes a requirement to alter the network to accommodate competitors' request for resale, unbundled network elements and interconnection at any technically feasible point. For example in its Interconnection Order the Commission states:

> "We further conclude that the obligation imposed by Section 251(c)(2) and 251(c)(3) include modifications to incumbent LEC facilities to the extent necessary to accommodate interconnection or access to network elements." ¶ 198.

Unit costs estimated by proxy cost models that inappropriately assume unrealistic levels of static efficiency can, at best, provide lower bounds for the unit costs of efficient networks in practice. That is one reason why booked costs (which include the consequences of network actions actually undertaken) usually exceed incremental costs derived from a hypothetical bottoms-up approach. Only real costs have real consequences; therefore, public policy deliberations need to be informed by costs as they actually are, not as they could be in a perfect frictionless world. The primary economic issues at stake in this proceeding concern the manner in which static models deal with a changing market and regulatory environment. A dynamic environment tests the stability and flexibility of a cost model, and the following discussion examines that issue in detail.

2. Hypothetical Costs in a Dynamic Environment

Local exchange competition and more relaxed regulation of incumbent LECs are expected to alter fundamental and long-standing public policy arrangements regarding universal service, the pricing of regulated services, and access to the networks of incumbent carriers. Given the Telecommunications Act's prescription that the cost of any Federal universal service program should be shared in a competitively neutral way by *all* providers of interstate service,

the priority is now to determine the cost of that program as a prelude to determining the contribution of each service provider.

Some proxy cost models have been offered as instruments for determining the cost of basic residential exchange service in a world of perfectly optimized networks. The implication is that any excess of an ILEC's actual cost over the benchmark or threshold cost established by proxy cost models should be attributed strictly to the incumbent's inherent inefficiencies and, therefore, be declared ineligible for recovery through the rates for the incumbent's regulated services. Put another way, the proxy model proponents pretend that the incumbent ILEC's actual cost should be compared to a hypothetical optimized network's cost, and any excess actual cost should be disallowed for recovery through the universal service funding system.

There are two fundamental problems with this position. First, if the hypothetical optimized network can never be reasonably achieved by an efficient incumbent LEC, then of what value is the comparison between actual costs and hypothetical costs? While a new entrant LEC could aspire to build a complete start-up network to serve current demand, such aspirations are beyond the capability of ILECs with long histories in the business. Moreover, even if the hypothetical optimized network can be achieved, at any point it would quickly become suboptimal and would need to be rebuilt constantly.

Second, in view of the fact that unexpected costs do arise under actual operation, even the most efficient LEC can expect its actual costs to exceed the costs produced by the engineering bottoms-up approach. This is the real world with friction, one in which not every aspect of a LEC's operations can be predicted and its consequences evaluated in advance. Even LECs that adopt cost-minimizing production techniques based on forward-looking technologies must contend with the vagaries of uncertain demand in a changing and competitive marketplace or unexpected developments such as political or policy change or catastrophic weather events. Therefore, the implicit message of proxy cost models based on unrealistic views of perfect optimization that any cost in excess of that calculated by the model should be attributed to inefficiencies is overly simplistic and utterly misleading.

These reasons make a dispassionate observer skeptical of the costs produced by models of hypothetical networks that depart substantially from actual networks. These models lead to